The 16-17 January 2003 Snow Event in the Mountains and Foothills of the Western Carolinas and extreme northern Georgia

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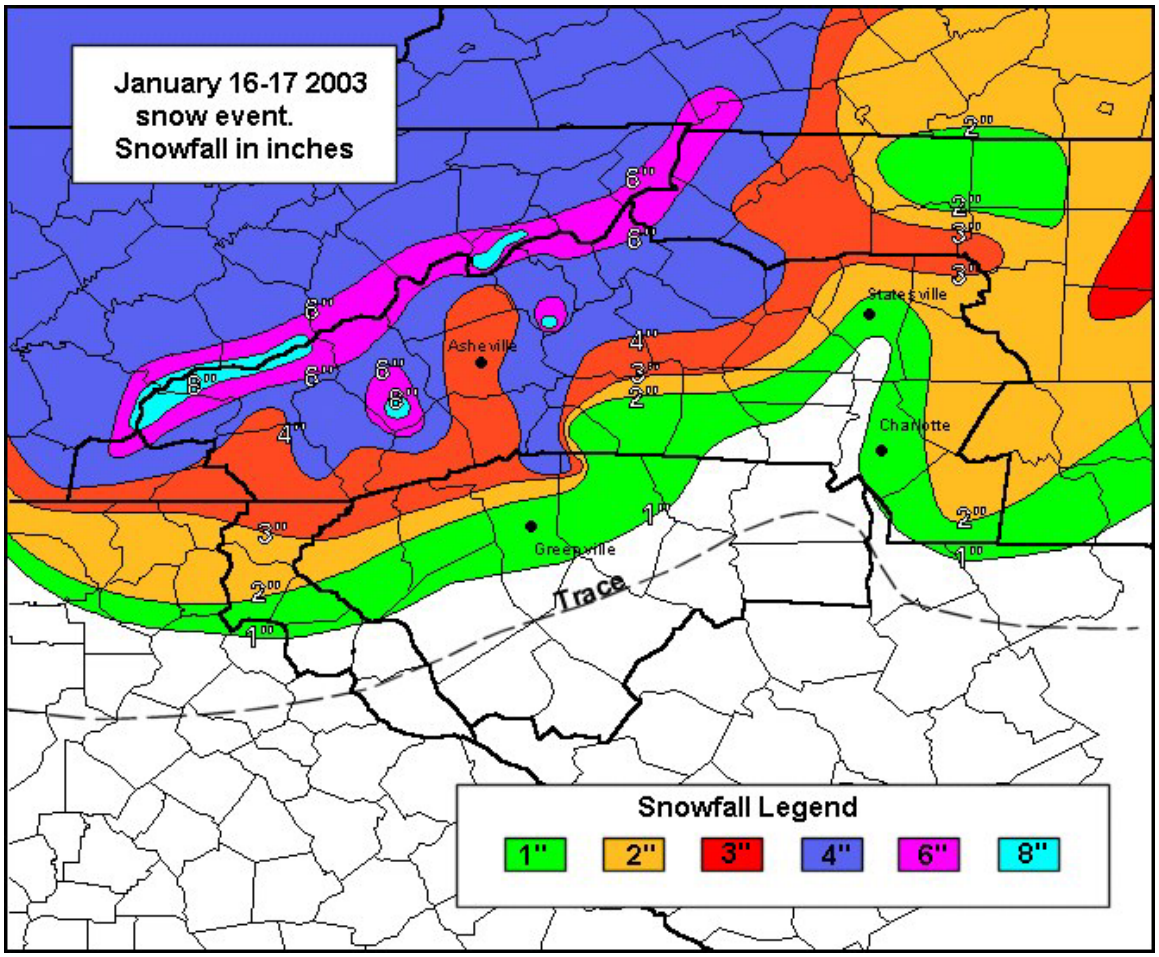

Figure 1: Snowfall totals from the 16-17 January 2003 event. Most of the snow fell within 12 hours with the exception of the Tennessee border counties where upslope snow fell for a longer period of time.

1. Introduction

A strong, fast moving 500 mb short wave trough crossed the region during the evening of 16 January 2003. A period of moderate to heavy snow fell across much of the mountains of the western Carolinas and northeast Georgia, as well as the North Carolina foothills. Farther to the south, lighter accumulations of snow fell, with just rain falling south of Interstate 85. See Fig. 1 for a map of snowfall totals. While an event with only snow and rain is something of a rarity east of the mountains in the western Carolinas, there have been three such events during the past two winters, all of them in January. This brief

review is primarily intended to highlight snowfall distribution and some lessons learned from the event.

2. Discussion

Several days out, the GFS had a good handle on the track of the 500 mb short wave responsible for the snow. The Eta waffled a bit more on the track of the 500 mb and surface lows, though it too did a good job closer to the event. There was some question as

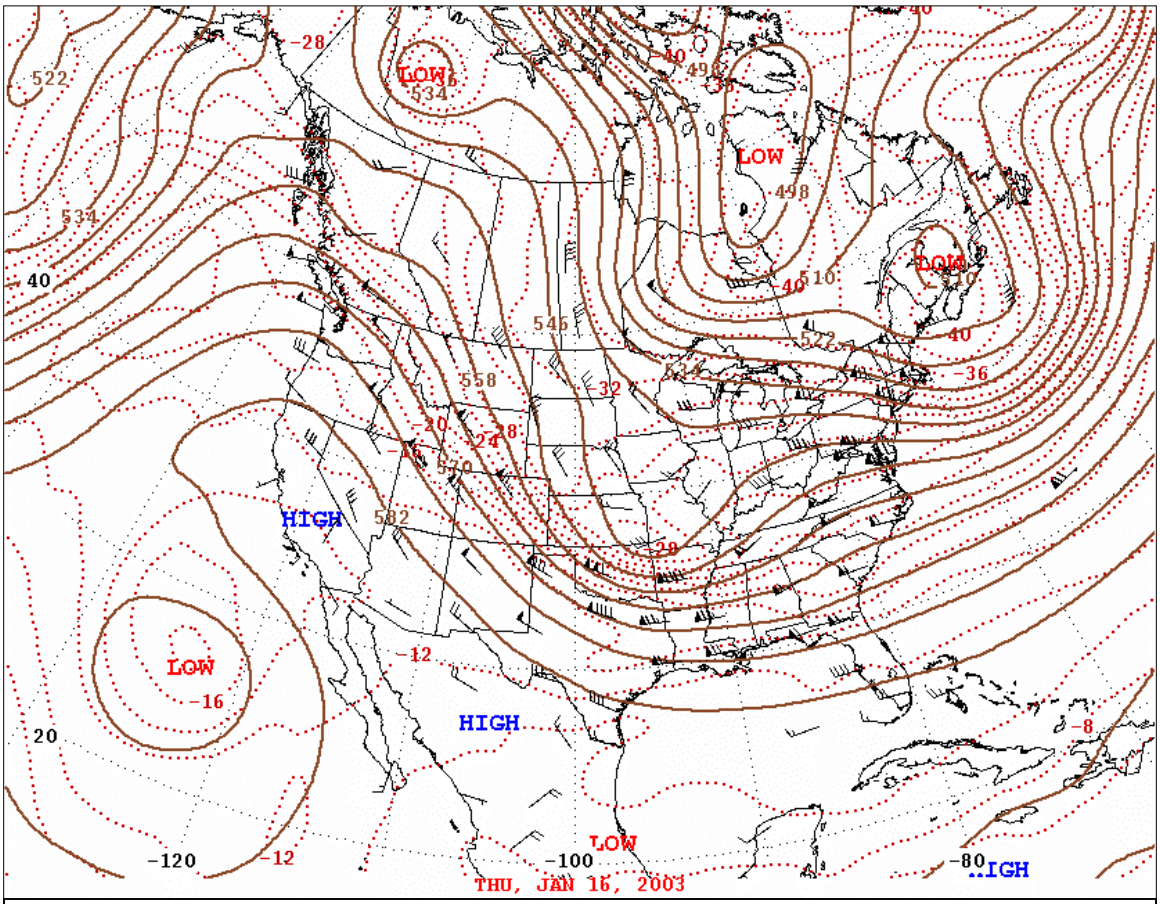

Figure 2: 16 January 12 UTC 500 hPa geopotential heights, temperature in deg C and winds in knots

to the location of the rain/snow line. The NCEP SREF (short range ensemble forecast) positions of the 0 deg C 850 mb temperature contour verified quite well for several runs before the event. A more important question was whether enough snow would fall to reach Winter Storm criteria. It was fairly certain that the Tennessee border counties would verify as a protracted period of upslope snow was expected behind the system. However, across the remainder of the mountains and foothills, the 12-km Eta and T254 GFS QPF values were consistently a too low for Winter Storm criteria snowfall (see Fig. 4)

Strong upper troposheric forcing, and a period of low-level southerly upslope flow into the mountains (Fig. 3), were considered sufficient enough reason to issue a Winter Storm

Warning for the mountains of the Carolinas and northeast Georgia despite the low QPF. It should also be noted that the Canadian GEM model had up to a half inch of liquid precipitation along the eastern escarpment of the Blue Ridge. The warning was issued by the midnight shift during the early morning hours of 16 January, a little more than 12 hours before the snow began. A watch was not issued prior to the event. The warning verified quite well, though Winter Storm criteria snow also fell across most of the North Carolina foothills (see Fig. 1). A warning was issued just a few hours before criteria were reached in these counties. However, there was certainly not sufficient lead-time on the warning for it to be considered effective.

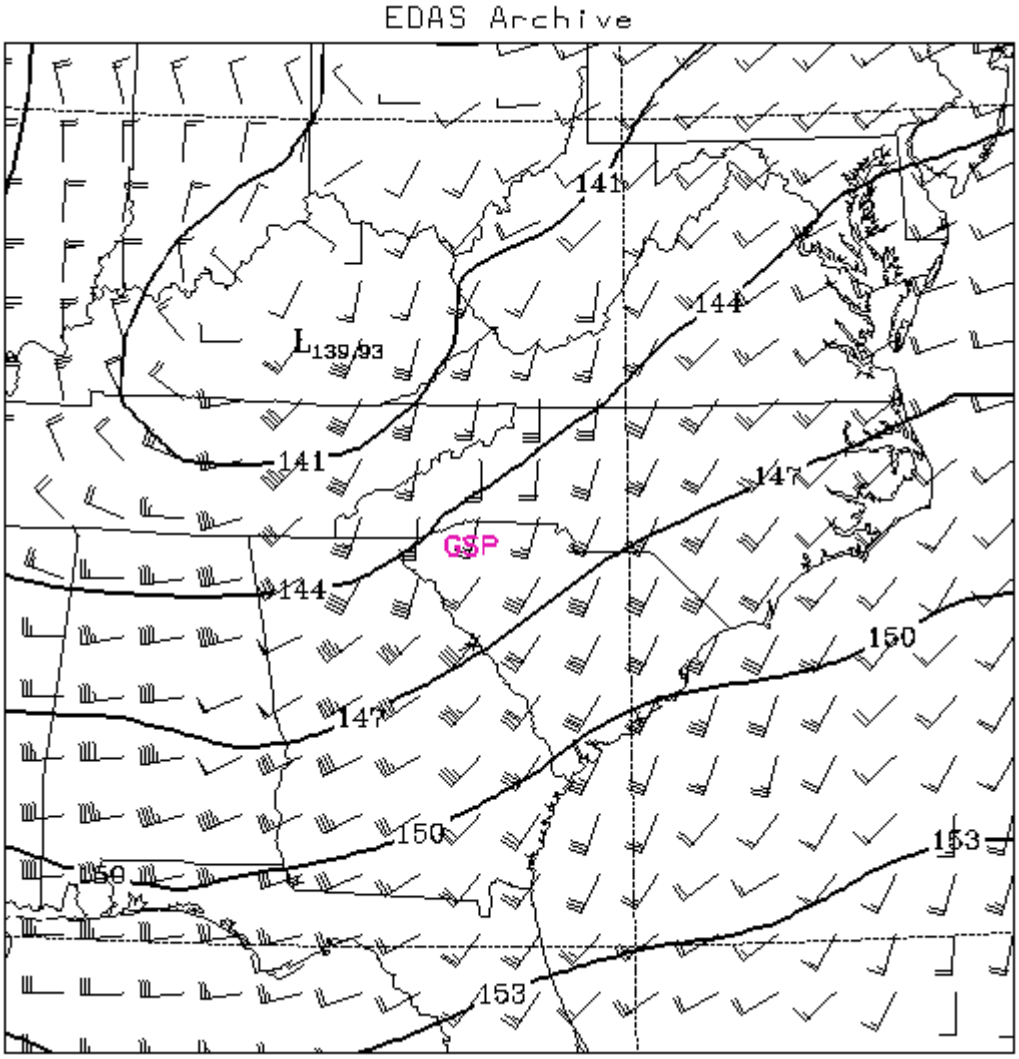

Figure 3: ARL EDAS image of the 2100 UTC 16 January 2003 850 mb heights and winds in knots.

It is suspected that the low level upslope also helped produce the higher than expected snowfall totals east of the mountains. In addition, the relative humidity was high through a significantly deeper part of the troposphere across the northern part of the CWA than it was to the south. This was the result of a weak deformation zone immediately north of the track of the 500 mb vorticity center. Though radar returns were not very impressive in

the northern foothills of North Carolina, the combination of a saturated column and good upslope was what sent totals over the winter storm criteria of 3 inches in 12 hours.

Discussion

The Canadian GEM and the NCEP SREF both made a positive contribution to the prediction of snowfall amounts with this event. The Canadian and GFS again proved to

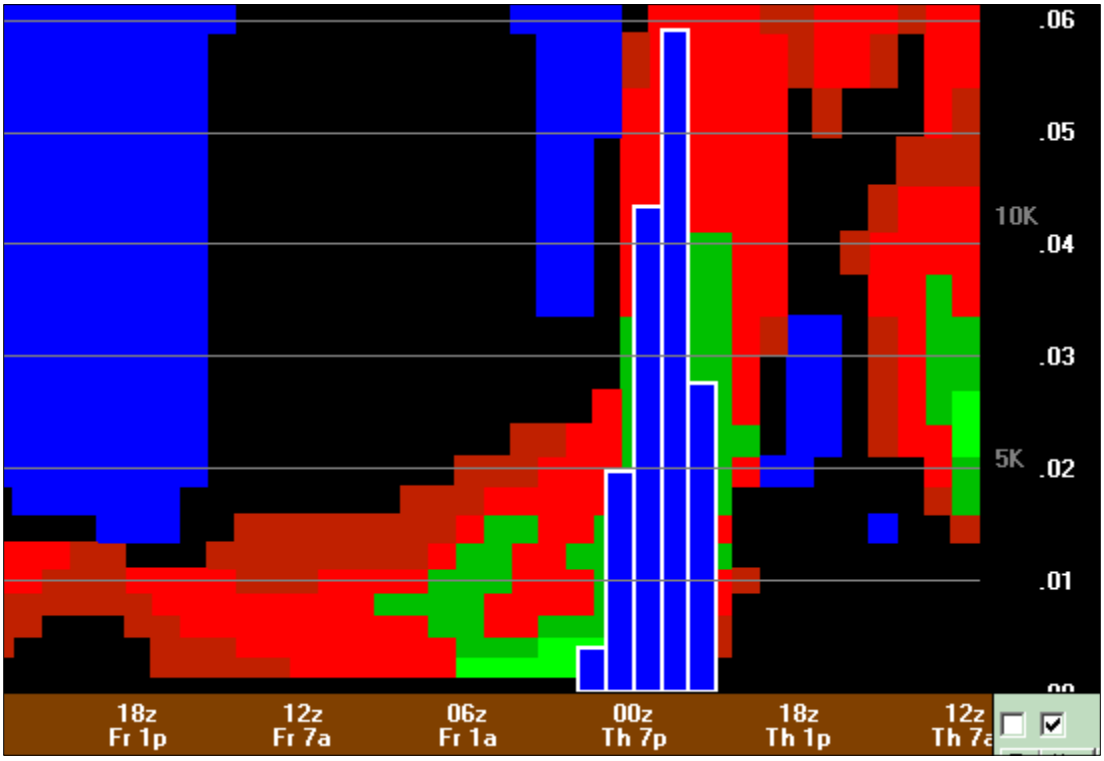

Figure 4: Eta BUFKIT time section of relative humidity and liquid equivalent precipitation (amounts in hundredths of an inch) at the Asheville airport from the 1200 UTC 16 January run of the 12-km Eta. Total liquid amount is about .15 inch.

be consistent in their placement of this system several days out. The winter weather experiment coordination with NCEP was also useful during this event. While most of the numerical models had low QPF, it was agreed among the chat participants that the amount of forcing and relatively cold 850 mb temperatures, coupled with orographic effects, would be sufficient to produce a Winter Storm. This was not the type of system that lent itself well to advance notice as the short wave responsible for the snow was fast moving and of low amplitude.